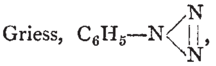
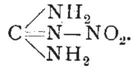
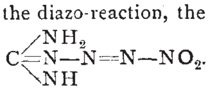
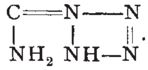
product of the latter operation. In order to obtain the free compound itself, the silver salt was prepared by allowing the distillate to flow into a solution of silver nitrate, and the precipitated silver salt, after drying, was decomposed with sulphuric acid. In a subsequent communication (comp. NATURE, vol. xliii. p. 378), Prof. Curtius, in conjunction with Dr. Radenhausen, showed that the pure compound was a very volatile liquid, boiling at 37°, and of fearfully explosive properties. In the current number of the *Berichte*, Drs. Noelting and Grandmougin, of Mülhausen, publish a preliminary note, in which they describe a new, and from the point of view of its constitution most important, method of preparing the liquid. The phenyl ester of azoimide is the diazobenzene imide of Griess, , just as chlorbenzene is the phenyl ester of hydrochloric acid. In view of the great stability of the esters of aromatic radicles, it was hardly to be expected that diazobenzene imide would yield azoimide upon saponification. But Drs. Noelting and Grandmougin considered that it might be possible to obtain the latter by decomposing a nitro-derivative of diazobenzene imide by means of alkalies, inasmuch as the introduction of nitro-groups generally effects a considerable increase in the mobility of the acid radicle, rendering its removal by processes of saponification much less difficult. They therefore prepared the dinitro-derivative of diazobenzene imide from dinitro-aniline by means of the usual diazo-reaction—conversion into the perbromide, and treating with ammonia. When treated with alcoholic potash, this dinitro-diazobenzene imide readily decomposes into the potassium salt of dinitro-phenol and azoimide. Upon acidifying the product of the reaction and subjecting it to distillation, an aqueous solution of azoimide passes over, which may be converted into the anhydrous liquid by the method described by Prof. Curtius. The properties of the anhydrous azoimide obtained by this new method agree completely with those detailed by Prof. Curtius.

THE second new method of preparing azoimide was communicated by Dr. Thiele, of Halle, at the Versammlung deutscher Naturforscher und Aerzte, held in that city in September last. In the course of an investigation of the compounds of guanidine, nitro guanidine was obtained, . Upon treating this compound with acetic acid and zinc dust, it is reduced to amido-guanidine, a substance which forms well-crystallized salts. By boiling the latter with soda, decomposition ensues, with formation of free hydrazine, N_2H_4, which may be very conveniently prepared by this method. Upon subjecting the nitrate to the diazo-reaction, the diazo-nitrate of guanidine is obtained, . This compound readily breaks up on warming into two compounds, one of which is azoimide, and the other a complex acid of the composition CN_5H_3, and the curious constitution  $\begin{array}{lll} C & = N & - N \\ | & \;| & \;\| \\ NH_2 & NH & - N \end{array}$. The azoimide may be obtained by distillation in a manner similar to that described above.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* ♂) from India, presented by Mr. W. Harrow; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mrs. Cotton; a Common Marmoset (*Hapale jacchus*) from South-East Brazil, presented by Mrs. Trelawny; a Gannet (*Sula bassana*), British, presented by Mr. J. Hitchman; a Smooth Snake (*Coronella lævis*) from Hampshire, presented by Mr. F. C. Adams; ten Smooth Snakes (*Coronella lævis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

DISTRIBUTION OF LUNAR HEAT.—Mr. Frank H. Very's essay on the distribution of the moon's heat and its variation with the phase, which gained the prize of the Utrecht Society of Arts and Sciences in 1890, has recently been published. A bolometer in connection with a very sensitive galvanometer was used in the research, and the plan has been to project an image of the moon about 3 centimetres in diameter by a concave mirror; and to measure, not the heat from the whole of this, but only that in a limited part of it, from $\frac{1}{25}$ to $\frac{1}{30}$ of the area of the disk, the observations being repeated at different points and at different phases. Measures made six hours after full moon show that the east limb was hotter than the west limb in the proportion of 92·2 to 88·9. In one observation, made a day after full moon, the excess of heat at the east limb was much larger. There is a regular decrement of heat in passing from higher to lower latitudes, and observations on this point appear to indicate that heat is accumulated after many days of continuous sunshine. The heat in the circumferential zone of the full moon differs from that of the centre by about 20 per cent. In this respect, therefore, the thermal image is like the visual one. There seems to be some evidence that bright regions radiate a little more than dark during the middle of the lunar day; but this is not quite proved, and with a low altitude of the sun the effect is reversed. A comparison of the curve drawn by Zollner for the moon's light with that deduced from Mr. Very's observations brings out the point that visible rays form a much larger proportion of the total radiation at the full than at the partial phases, the maximum for light being much more pronounced than that for the heat. The diminution of the heat from the full to the third quarter is shown to be slower than its increase from the first quarter to the full. This result agrees with that obtained at Lord Rosse's Observatory, and is direct evidence of the storage of heat by lunar rocks.

GEOLOGICAL SOCIETY OF AMERICA.

THE Geological Society of America met at Washington on August 24 and 25. Owing to the death of the President, Prof. Alexander Winchell, Vice-President Gilbert took the chair.

The meeting was opened with an address on the late President by his brother, Prof. N. H. Winchell. Alexander Winchell was born on December 31, 1824, in Dutchess County, N.Y., and died at Ann Arbor on February 19 last. His work was many-sided. He had studied to be a civil engineer; had a strong leaning towards theology. He also read medicine and was a fine mathematician. He loved music, wrote poetry, and modelled in clay and plaster. As a financial resource he became a teacher, and was very successful. He became famous by his arguments on "The Bible History of the Creation," and published in the *Christian Advocate* "Adamites and Pre-Adamites," an exposition of Scriptural and scientific harmony. For four years he lectured on geology at Vanderbilt University. During his long connection with the University of Michigan he wrote many scientific articles of a popular nature, and did a great deal to popularize geological science. The speaker spoke eloquently of his dead brother's long and splendid connection with the Ann Arbor University. His death was most touchingly described. Oddly enough the last words he uttered in public were these: "When I speak to you again it will be of the inhabitants of another world." He had just finished his weekly lecture, and referred in his closing sentence to the subsequent lecture that was never delivered. He discovered many new geological species, and many other geologists testified their admiration for him by naming after him species they discovered. His great work for the Geological Society was touched on, and the speaker expressed his conviction that the next generation would keenly feel the beneficent influence of his brother's work. At the conclusion of the memorial Prof. Edward Orton, Dr. C. A. White, and Mr. C. R. Van Hise were appointed a committee to draft resolutions expressive of the Society's regret at the death of its President.

Prof. Dr. Gustav Steinmann, of the University of Freiburg, Germany, read the first paper, which consisted of the description of a geological map of South America. A large copy of the map was hung up beside the platform, and small replicas were distributed among the audience. Dr. Steinmann, who is a young, bearded, spectacled, typical German student, was sent to

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South America by the Strasburg University some ten years ago, and spent some two years making a most thorough research in the geology of the continent, the tangible result being the remarkably complete map exhibited. His researches in South America prove that there is a most remarkable similarity between the geology of the two Americas, and especially between the geology of the southern United States and the southern continent.

The second paper was by Dr. August Rothpletz, of the University of Munich, Germany, on the Permian, Triassic, and Jurassic formations in the East Indian Archipelago. The doctor's paper was devoted to the description of some Mesozoic and Palæozoic fossils collected in two of the Indian islands by his friend Dr. Wichmann, during a geological exploration of the islands. Dr. Wichmann being geologist of the University of Utrecht, Holland, the collections were of particular value, and Dr. Rothpletz's description and classification of them, to which he devoted his paper, was thorough and minute. He took occasion to ridicule some of the classifications of fossils which put them in one category when found in one place and in another when found somewhere else.

"Thermometamorphism in Igneous Rocks" was the title of the next paper presented. It was by Mr. Alfred Harker, of St. John's College, Cambridge, England, and dealt with the effects of high volcanic temperatures in the formation of rocks. He described the results of his researches in the lake region of England, where the volcanic forces of nature were particularly well marked.

Prof. Alexis Pavlow of the University of Moscow, Russia, presented a paper entitled "Sur les Couches Marines terminant le Jurassique et commençant le Crétace, et sur l'Histoire de leur Faune."

Another paper, also in French, presented by Prof. Max Lohest, of the University of Liége, Belgium, was entitled "Sur l'Homme contemporain du Mammouth en Belgique." The contemporaneous existence of man was supported by proofs additional to those heretofore given.

Baron Gerald de Geer, of Sweden, gave an interesting account of recent changes of level along the sea-board of the Scandinavian peninsula.

The most important new matter presented was a paper on "Fossil Fishes of the Lower Silurian Rocks of Colorado," by Mr. C. D. Walcott, of the United States Geological Survey. The discovery of the fossil fish remains is of recent date, and attracts great attention among zoologists and geologists from its carrying back into the past, over a great time interval, our knowledge of vertebrate life. They are the oldest vertebrate remains known, and appear to be the ancestral types of the great ichthyic fauna of the classic "old red sandstone" of Europe, and the Devonian group of America.

In the discussion, Profs. Von Zittel, Jaekel, and F. Schmidt compared the fish remains exhibited with those of the Devonian, and stated that the Upper Silurian types were not represented in the fauna.

SECOND DAY.—From the committee appointed to draft appropriate resolutions relative to the death of Dr. Alexander Winchell, the President of the Society, Prof. Orton made a report which was adopted. The resolutions reported paid a just and touching tribute to the character of the deceased, and fittingly acknowledged the great services which he had rendered to the science in the course of the forty years of arduous and unremitting toil which he had devoted to its investigation. To his writings and lectures were attributed in a great degree the growing liberality and enlargement of thought of the more serious-minded portion of the community in regard to the theory of organic evolution as presented by Darwin and his successors. Dr. Winchell, the report affirmed, stated and defended with marked ability and courage and persuasive power this the most characteristic and far-reaching doctrine of modern geological science. "The first enunciation of this doctrine," the report stated, "was sure to awaken distrust and even bitter hostility among a large class of people because of its apparent incompatibility with some of their most fundamental convictions and beliefs. To disregard the sincere apprehension of this great class, comprising, as it does, so much of the moral and intellectual force of the body politic, would be heartless. To mock at its fears, ill founded though they were, would be worse. What worthier service to science and the community than to disarm hostility by showing that the evolutionary philosophy, so far from degrading and dishonouring man, makes him in a peculiar sense the head and crown of the creation?"

In seconding the resolutions Dr. C. A. White paid a warm tribute to Dr. Winchell, with whom he had been on terms of intimacy for many years. As a further mark of respect the resolutions were adopted by a rising vote.

The first paper presented was by Dr. Frederick Schmidt, of St. Petersburg, Russia.

Prof. Gregoire Stefanescu, of the University of Bucharest, Roumania, presented "Sur l'Existence du Dinotherium en Roumanie," the next paper. The Professor read it in French, illustrating it by drawings on the blackboard, and after he had finished, Prof. Dr. Charles Barrois read it over again in English, so that those who did not know French might not lose it. Though quite short the paper was very interesting. It briefly described a large number of bones of the Dinotherium found widely distributed over Roumania, which indisputably pointed to the existence of this almost unknown extinct animal in that land countless years ago. This was probably the largest mammal that ever inhabited the earth, its epoch being the Tertiary period. It had enormous tusks, that curved downward and backward in such a way that it could only hurt itself with them, and probably had a massive trunk. In character it more nearly resembled the elephant and rhinoceros of modern ages than any other known animal.

Prof. A. N. Krassnof, of the Charkow University, Russia, read the next paper on the black earth of the steppes of Southern Russia, its origin, distribution, and points of resemblance with the soils of the prairies of America. The paper traced the resemblance between the Russian steppes and the American prairies to their similar origin in the layers of the vegetables of years. Their remarkable fertility was touched on generally, and a technical account of the origin of the two plains was given.

TECHNICAL CHEMISTRY.

IN his Cantor Lectures on Photographic Chemistry, delivered last spring before the Society of Arts, and just issued by the Society in a separate form, Prof. Meldola opens with some remarks on the special position of technical training in chemistry, which should be carefully conisdered in connection with the present widespread movement in the direction of technical education throughout the country. He says:—

"There are many who identify technical instruction with the teaching of some handicraft, a notion which has no doubt arisen from the identification of technical skill with manual dexterity in some mechanical industry. By the adoption, either tacitly or openly, of this narrow definition, the chemical industries have suffered to a very large extent in this country, because their progress is more dependent on a knowledge of scientific principles, and much less dependent on manual dexterity than any of the other subjects dealt with in schemes of technical instruction. Now, in order to give technical instruction in a subject like photography, which is so intimately connected with chemistry, we may adopt one of two courses. The student may become a practical photographer in the first place, and may then be led on to the science of his practice by an appeal to the purely chemical principles brought into operation. This may be called the analytical method. The other method is to give the student a training in general chemistry first, and then to specialize his knowledge in the direction of photography. This may be regarded as a synthetical method.

"In other departments of technology, and especially in those where the underlying principles are of a mechanical nature, the analytical method may be, and has been, adopted with success. It is possible to lead an intelligent mechanic from his every-day occupations to a knowledge of the higher principles of mechanical science by making use of his experience of phenomena which are constantly coming under his notice. From this it is sometimes argued by those who are in the habit of regarding technical instruction from its purely analytical side, that technical chemistry can be taught by the same method. Some teachers may possibly succeed in this process, but my own experience, both as a technologist and a teacher, has led me to the conclusion that, for chemical subjects, the analytical method is both too cumbersome and circuitous to be of any real practical use. No person engaged in chemical industry in any capacity—whether workman, foreman, manager, or proprietor—can be taught the principles of chemical science out of his own industry, unless he has some considerable knowledge of

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